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Report to the Chair, Subcommittee on
Government Activities and
Transportation, Committee on
Government Operations, House of
Representatives

September 1991

TRANSPORTATION SAFETY

Information Strategy Needed for Hazardous Materials



Information Management and
Technology Division

B-244178

September 25, 1991

The Honorable Barbara Boxer
Chair, Subcommittee on Government
Activities and Transportation
Committee on Government Operations
House of Representatives

Dear Madam Chair:

As you know, information plays a critical role in the Department of Transportation's (DOT) mission of regulating the movement of hazardous materials (commonly referred to as HAZMAT) across the nation. In response to your request, we determined whether (1) key initiatives to improve longstanding HAZMAT information shortcomings were successful, and (2) any strategy guides the Department in directing the information management and technology resources devoted to its hazardous materials mission. (See app. I for details of our objectives, scope, and methodology).

Results in Brief

As the DOT focal point for HAZMAT regulation, the Research and Special Programs Administration (RSPA) must have reliable information to assess safety regulations covering the hundreds of thousands of HAZMAT shippers, carriers, and container manufacturers. However, as previously reported by us, the U.S. Office of Technology Assessment (OTA), and DOT itself, the Department lacks accurate, complete data to monitor this vast community.

DOT's progress in improving this situation has been slow; two initiatives to improve Departmentwide HAZMAT information management of inspection and enforcement activities have floundered. As a result, DOT is unable to use information effectively to evaluate improvements in safety accruing from its inspection and enforcement activities or support Departmentwide HAZMAT enforcement activities.

Information resources management strategies are designed to identify ways in which information and technology can be used effectively to support mission needs and are thus very useful in addressing the type of HAZMAT information problems DOT is experiencing. However, because DOT has no directives outlining Departmentwide HAZMAT information management responsibilities, neither RSPA's Office of Information Resources

nor DOT's Office of Information Resources Management conducts strategic information resources planning for hazardous materials. Without such a strategy, DOT faces difficulties in applying information technology Departmentwide and in resolving longstanding information shortcomings.

Background

DOT estimates that about 4 billion tons of regulated hazardous materials are transported annually within the United States, with approximately 500,000 movements occurring each day. Regulations governing HAZMAT transportation cover thousands of different hazardous materials, ranging from gasoline to radioactive materials.

Publicity on incidents involving fatalities and property or environmental damage has heightened public concern about the safety risks associated with the transportation of HAZMAT. In 1990, DOT received reports of over 8,500 incidents, involving about \$33 million in damages. Figure 1 shows the number of reported hazardous materials incidents that occurred in 1990.

to RSPA.¹ RSPA is responsible for developing regulations governing the definition and classification of hazardous materials, shipper and carrier HAZMAT transportation operations, and specifications for HAZMAT packaging and containers.

Except for bulk transportation of hazardous materials by marine vessels (a responsibility delegated exclusively to the United States Coast Guard), RSPA issues regulations covering all aspects of HAZMAT across the different modes of transportation (air, water, rail, roadway).² Within DOT, RSPA is the lead agency for cross-modal HAZMAT enforcement issues and shares enforcement responsibility with four DOT administrations—Federal Aviation Administration, Federal Highway Administration, Federal Railroad Administration, and the United States Coast Guard.

Enforcement activities include (1) on-site safety inspections of equipment, containers, and facilities used for shipping or moving hazardous materials; and (2) audits of company records and procedures to determine compliance with HAZMAT and general safety regulations. RSPA has primary enforcement authority over HAZMAT shippers that use multiple modes of transportation and HAZMAT container manufacturers, reconditioners, and retesters.³ The other DOT administrations have enforcement jurisdiction over shippers and carriers of hazardous materials operating in their respective transportation modes.

¹This delegation is outlined in 49 CFR, Subtitle A, Sections 1.4 (i) and 1.53 (b). RSPA's Office of Hazardous Materials Safety is specifically charged with this responsibility. Besides hazardous materials safety, RSPA is responsible for establishing pipeline safety standards; developing policies and programs for federal transportation emergency preparedness; developing and conducting training programs to support safety and security management of transportation functions; and providing a broad range of information systems development and technical support, data base maintenance, and transportation-related technology research.

²DOT comprises nine administrations, largely organized by modes of transportation and safety functions. These are the Federal Aviation Administration, Federal Highway Administration, Federal Railroad Administration, Maritime Administration, National Highway Traffic Safety Administration, the Research and Special Programs Administration, St. Lawrence Seaway Development Corporation, the United States Coast Guard, and the Urban Mass Transportation Administration.

³Some hazardous materials containers can be reconditioned and others are periodically tested to ensure that they continue to meet RSPA safety regulations.

DOT Lacks Essential Information to Support Hazardous Materials Safety

Information collection, management, and dissemination are important factors in DOT's hazardous materials program. Despite the important role of information, DOT lacks accurate, complete data to monitor the vast HAZMAT community it regulates, and to better support its enforcement activities involving HAZMAT shippers and carriers.

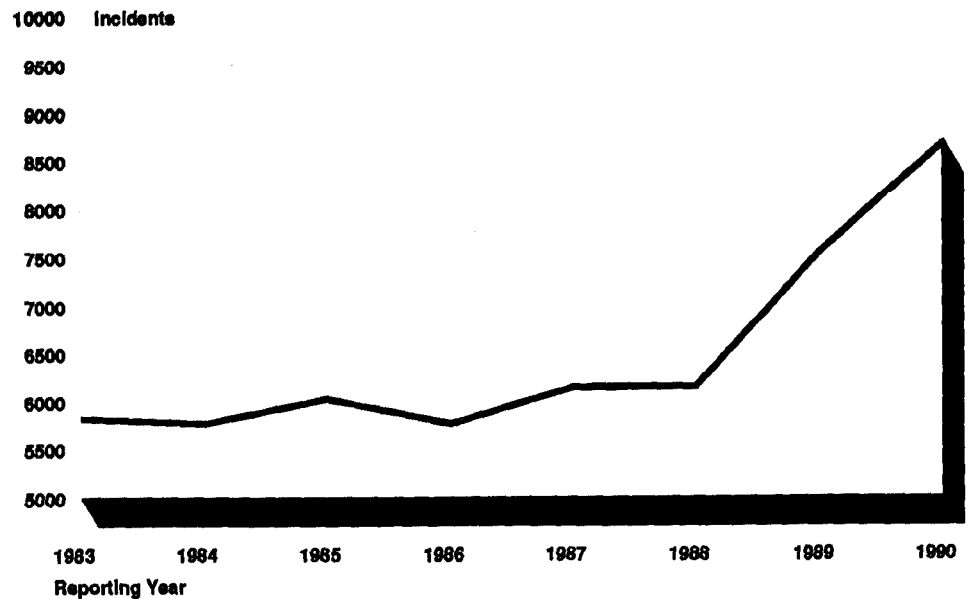
HAZMAT Incident Data Provide Incomplete Safety Picture

To assess overall HAZMAT safety and regulatory compliance, DOT uses data from HAZMAT incident reports and inspections of container manufacturers, carriers, and shippers.⁴ These data on the number of HAZMAT incidents largely guide risk assessment and evaluation of program success.⁵ Figure 2 shows the trend in the number of HAZMAT incidents reported to RSPA since 1983.

⁴DOT requires written reports from carriers whenever a HAZMAT incident occurs. RSPA defines an unintentional release of hazardous material during transportation as an incident.

⁵Risk assessment attempts to estimate the frequencies and consequences of undesirable events—in this case, release of hazardous materials that can threaten public health and safety. Risk assessment tries to determine what the level of risk is, and then compares it against a risk level deemed acceptable by decisionmakers.

Figure 2: Hazardous Materials Incidents Reported to RSPA, 1983-1990^a



^aRSPA linked increases in 1989 and 1990 with better reporting by the HAZMAT carriers.
Source: Research and Special Programs Administration, DOT.

Past reviews by us and by OTA have found that DOT's HAZMAT incident data are incomplete. For example, we previously reported that in addition to the carriers who presently make reports, DOT does not require shippers involved in hazardous materials incidents to file reports.⁶ This nonreporting underestimates the number of incidents that have occurred and leads to DOT's using incomplete information to schedule inspections. We also noted that, unlike carriers, DOT does not require the systematic registration of HAZMAT shippers, leaving the Department with incomplete knowledge of the organizations it regulates and dependent upon its inspection program, incident reports, and external data sources to identify new or existing shippers.

Moreover, our past reports have shown that DOT often does not put the information it has to its best use. For instance, we have reported that the Federal Railroad Administration (1) has not taken measures to target high risk HAZMAT rail carriers and shippers for inspection, and (2) does not routinely use current inspection data when settling penalty

⁶Railroad Safety: DOT Should Better Manage Its Hazardous Materials Inspection Program (GAO/RCED-90-43, Nov. 17, 1989).

cases involving safety violations.⁷ At the conclusion of our review, Federal Railroad Administration officials stated they had initiatives underway to gather additional data to improve targeting of inspections.

OTA has also previously found underreporting and misreporting problems with RSPA's primary system—the Hazardous Materials Information System.⁸ This condition was more recently confirmed by us.⁹ RSPA has acknowledged that incident data in this system provide an incomplete picture of HAZMAT transportation activities.

Past reports by us, OTA, and DOT itself have also noted that the Department lacks complete information on the volume or flow of HAZMAT shipped by transportation mode or packaging type. Without this additional information on the number of HAZMAT movements, it is difficult to estimate the trend in annual incident rates.

DOT has acknowledged many of these problems, and has sought to address solutions by delegating various activities to its different modal administrations. In many cases, however, corrective actions have proceeded slowly, lost momentum as priorities changed, or begun only in response to statutory mandate. For instance, despite our recommendation for a DOT HAZMAT shipper registration information program as early as 1980,¹⁰ DOT did not start planning for such a program until required by provisions of the Hazardous Materials Transportation Uniform Safety Act of 1990.

DOT Lacks Complete Information to Support Enforcement Efforts

The ability to target shippers and carriers is a vital part of the enforcement activities undertaken by the DOT administrations. With a universe of shippers, carriers, and container manufacturers numbering in the hundreds of thousands and an inspection force only in the hundreds, it is important that the administrations have timely access to information—the key to enforcement. According to several DOT officials, information generated from incident reports, previous DOT compliance audits,

⁷Railroad Safety: Weaknesses Exist in FRA's Enforcement Program (GAO/RCED-91-72, Mar. 22, 1991); Railroad Safety: Weaknesses in FRA's Safety Program (GAO/T-RCED-91-32, Apr. 11, 1991).

⁸Transportation of Hazardous Materials, United States Office of Technology Assessment, July 1986.

⁹GAO/RCED-90-43, Nov. 17, 1989.

¹⁰Programs For Ensuring The Safe Transportation of Hazardous Materials Need Improvement (CED-81-5, Nov. 4, 1980).

state and local law-enforcement reports, and shipper/carrier registrations with other federal and state regulatory agencies can be critical for targeting high-risk offenders for inspection.

Although DOT recognizes that this type of information is essential, much of it is not readily available. For example, neither RSPA or the other DOT administrations maintain complete noncompliance or violation histories on intermodal shippers and carriers. DOT acknowledges that such information could be useful in targeting inspection and monitoring activities at companies with established HAZMAT safety violation histories. More important, this information should be considered when assessing civil penalties and fines for repeat violators.

Similarly, because of the lack of information at the Federal Railroad Administration, some inspectors identified HAZMAT shippers by checking telephone directories, asking railroad staff, and reading newspapers. At the conclusion of our review, Federal Railroad Administration officials stated they were in the process of implementing new procedures to improve access to additional information. This is important since having access to better information could help prevent incidents, given that at the Federal Railroad Administration about 75 percent of the hazardous materials incidents are traced to shippers. At the Federal Highway Administration, the chief of the Hazardous Materials Program Division emphasized the need for better information on shippers. This is important because, as we determined, in 1990 over 50 percent of Departmentwide HAZMAT penalties involved shippers.

Key Initiatives to Improve HAZMAT Information Have Had Little Success

Despite DOT's recognition of the need for better HAZMAT information, two attempts to improve Departmentwide hazardous materials information management—obtaining better data to evaluate HAZMAT inspection and enforcement activities and creating a consolidated enforcement data base—have had little success. The absence of clearly defined Departmental HAZMAT information management responsibilities impairs DOT's ability to effectively organize, direct, or implement these Departmentwide information resources management efforts.

HAZMAT Information Initiative Not Completed

RSPA has recognized the need for better HAZMAT safety data, and initiated action to improve the quality of its Hazardous Materials Information System data. In 1987, in response to recommendations for improvements in data-gathering and maintenance activities made by the Secretary's Safety Review Task Force, OTA, and us, RSPA launched a major initiative

to assess its hazardous materials data activities.¹¹ The project's objectives were to assemble and review recommendations on how existing Hazardous Materials Information System data could be more effectively used and their accessibility improved; how the completeness and accuracy of these data could be improved; and what additional data were needed to meet RSPA's Departmentwide HAZMAT mission.

RSPA's Transportation Systems Center, working with officials from the Office of Hazardous Materials Safety and Office of Pipeline Safety, devised a three-phase project plan. Phase 1, completed in 1988, synthesized recommendations made by offices within RSPA and other parts of DOT involved in HAZMAT activities, other federal agencies, state and local governments, and industry groups. Phase 2, completed in 1989, evaluated phase 1 results and made recommendations for specific options. A final draft report was issued in May 1989.¹² Phase 3 was to develop a plan for implementing the recommendations selected in phase 2. Such a plan could be useful in identifying and reassessing HAZMAT information needs.

According to Office of Hazardous Materials Safety officials, neither a formal RSPA response nor management action plan was ever prepared addressing the data improvements recommended in phase 2; consequently, phase 3 was not initiated and the project was terminated. According to these officials, a lack of management attention to this initiative contributed to the lack of a specific RSPA response. As a result, recognized shortcomings with existing information affecting inspection and enforcement activities—such as consolidated enforcement data, better HAZMAT flow data, and comprehensive carrier and shipper registration programs—were left unresolved.

Consolidated Enforcement Data Base Project Suspended

In 1986 the Secretary's Safety Review Task Force recognized that successful enforcement of HAZMAT regulations depended on a combination of voluntary compliance, DOT modal administration and state enforcement efforts, and RSPA inspection and enforcement. In its report, the task force concluded that RSPA should take the lead in coordinating and directing

¹¹This project, conducted by RSPA's Transportation Systems Center, was officially known as the RSPA HAZMAT/Pipeline Data Improvement Study.

¹²Improving RSPA's Hazardous Materials Programs, Economic Analysis Division, Transportation Systems Center, U.S. Department of Transportation (May 1989).

Departmentwide enforcement activities.¹³ As one step toward this goal, the Secretary's Safety Review Task Force—using input received from an intermodal working group chaired by RSPA—recommended that a consolidated enforcement data base be devised.

The primary purpose of the consolidated enforcement data base was to provide DOT administrations with information on the past violation history of HAZMAT offenders that could be considered in assessing civil penalties. Information about pending enforcement actions against shippers was also to be collected and shared, to allow each mode to know if another one was involved in a pending case. In addition, administrations with active shipper inspection programs (RSPA, Federal Highway Administration, and Federal Railroad Administration) could use the information to consider whether or not to plan an inspection of a company or decide if one mode's enforcement case could be incorporated into another's.

Despite an acknowledged need in 1986, the data base has yet to be constructed. According to Office of Hazardous Materials Safety officials, unresolved data input and output issues still remain and the technical aspects of sharing data among incompatible automated systems have yet to be examined.

With the absence of automated enforcement data to accomplish the Safety Review Task Force recommendations, the risk of pursuing inefficient DOT HAZMAT enforcement actions continues. For example, despite the Hazardous Materials Transportation Act requiring consideration of any history of prior offenses by a shipper or carrier prior to civil penalty assessments, each modal administration routinely checks only its HAZMAT enforcement histories in its own data base. Until the consolidated enforcement data base becomes operational, opportunities for efficient, combined enforcement actions and a more effective use of information critical to penalty decisions are unnecessarily jeopardized.

¹³Report on the Hazardous Materials Program of the Research and Special Programs Administration, DOT Safety Review Task Force, Office of the Secretary, U.S. Department of Transportation (February 1986).

DOT Does Not Have a HAZMAT Information Strategy

Information plays an important role in DOT's ability to effectively regulate HAZMAT carriers, shippers, packaging, and container manufacturers. Due in part to the many problems DOT has had in identifying and collecting needed HAZMAT data over the last several years, the Hazardous Materials Transportation Uniform Safety Act of 1990 contains provisions to require DOT to identify and collect key HAZMAT information. Further, in his 1990 National Transportation Policy statement, the Secretary called for the Departmentwide collection and analysis of HAZMAT safety data. To meet this goal, an effectively designed and implemented information strategy is crucial.

Despite the Secretary's call, neither the Secretary's Office of Information Resources Management nor RSPA has constructed an information resources strategy to support the Department's HAZMAT program and the collection of the information mandated by the 1990 act. No DOT component is in charge of intermodal HAZMAT IRM activities. In addition, RSPA's role in coordinating and guiding Departmentwide HAZMAT information management activities is not addressed in any existing DOT orders.

Lacking a coordinated Departmentwide information resources strategy for hazardous materials, each DOT administration independently plans and implements its own information management and technology programs. The administrations that perform HAZMAT safety inspections and pursue enforcement actions have their own HAZMAT data bases. These data bases are largely used to store, process, and report registration data and data collected from routine safety inspections, accident and incident reports involving hazardous materials, and enforcement proceedings. (See appendix II for a listing of major DOT HAZMAT systems.) The systems are also used to compile summary statistics for periodic reports providing descriptive information on the number of HAZMAT incidents, number of inspections performed, injuries and damages resulting from incidents, and penalty cases being pursued. These systems were designed to support the specific information needs, administrative functions, and reporting requirements of the individual DOT administrations rather than to facilitate integrated, cross-modal HAZMAT information needs.

This structure has led to the creation of independent information systems and data bases, which each administration uses to support its HAZMAT inspection and enforcement activities. Better and more effective modal sharing of data could improve operational efficiencies for inspection and enforcement activities and program analysis.

Without the identification of common data needs across modes, attempts to share data are impaired. For example, in response to past criticism about the completeness of the incident data in the Hazardous Materials Information System, RSPA began comparing its incident data with modal incident data. According to the official in RSPA's Office of Hazardous Materials responsible for comparing the data, the process is tedious and time-consuming. It involves obtaining the magnetic tapes containing the incident data from the modal data base, writing a program to compare the data with the Hazardous Materials Information System data, obtaining a listing of potential incidents not included in the Hazardous Materials Information System, and then reviewing the paper files of the incident to determine whether it should be included. According to the official, even if computer software were written to compare the incidents, reviewing the paper files would still be necessary because not all of the information about the incident is maintained in the modal data base.

Conclusions

DOT has historically lacked critical information to effectively manage its hazardous materials mission; progress to date to improve in this area has been slow. Key initiatives designed to improve Departmentwide HAZMAT information collection and management have faltered. As a result, DOT's ability to effectively inspect shippers and carriers of HAZMAT and enforce HAZMAT regulations is impaired.

DOT lacks an information management strategy to provide underlying management structure and direction for these initiatives. No entity—including RSPA and the Office of the Secretary—conducts strategic information resources management planning for the Department's HAZMAT mission. Accordingly, each transportation mode pursues its own information approach and the Department encounters continuing difficulties in resolving longstanding Departmentwide information shortcomings.

Recommendation to the Secretary of Transportation

To address DOT's need for improved HAZMAT information, we recommend that the Secretary of Transportation assign responsibility to a Departmental component to develop a Departmentwide information resources strategy, plan, and implementation schedule for the hazardous materials safety program. Such a new strategy should

- establish information collection and automation program objectives that are linked to DOT's HAZMAT mission, state these objectives in measurable terms to facilitate Departmentwide evaluation, and institute priorities

for the Department's HAZMAT information management and automation efforts;

- specify procedures for defining, managing, and sharing HAZMAT safety data commonly used across all modal administrations involved in the inspection and enforcement activities of the Department;
- ensure that automated HAZMAT information systems throughout the Department are planned, developed, and enhanced conforming to a systems architecture that defines information requirements, flow and system interfaces, and shows how individual HAZMAT systems and major components fit together to satisfy DOT's needs; and
- include Departmental participation of the Research and Special Programs Administration, United States Coast Guard, Federal Railroad Administration, Federal Aviation Administration, Federal Highway Administration, and the Department's Office of Information Resources Management in the above activities.

Agency Comments and Our Evaluation

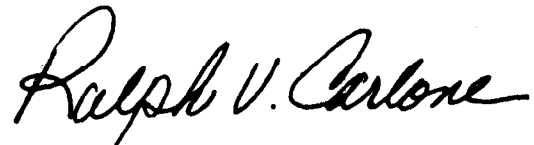
DOT officials acknowledged that the Department has had difficulties in acquiring and using key HAZMAT information, especially in the shipper area. However, they added that they have taken action to address some of the information deficiencies noted in the report, such as at the Federal Railroad Administration.

The report recognizes actions DOT has taken on specific information deficiencies. However, actions in response to individual modal administration problems will not resolve critical existing Departmentwide and cross-modal information shortcomings. Such resolution requires an overall Departmentwide information resources strategy.

As arranged with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution of it until 30 days from the date of this letter. At that time, we will send copies to the Secretary of Transportation; the Director, Office of Management and Budget; interested congressional committees; and other interested parties. Copies will also be made available to others upon request.

This report was prepared under the direction of JayEtta Z. Hecker, Director, Resources, Community, and Economic Development Information Systems, who can be reached at (202) 275-9675. Other major contributors are listed in appendix III.

Sincerely yours,



Ralph V. Carlone
Assistant Comptroller General

Objectives, Scope, and Methodology

The objectives of our review were to determine whether (1) key initiatives to improve longstanding HAZMAT information shortcomings were successful, and (2) any strategy guides the Department in directing the information management and technology resources devoted to its hazardous materials mission.

To do this, we interviewed officials in Washington, D.C., at DOT's Office of the Secretary, RSPA, Federal Aviation Administration, Federal Highway Administration, and Federal Railroad Administration, and discussed DOT's HAZMAT program, associated information resources planning, and the information systems and technology used to support the program. At RSPA we obtained views on data quality and information management issues and on past and ongoing initiatives from the Associate Administrator for Hazardous Materials Safety, and from officials in the Office of Hazardous Materials Planning and Analysis and the Office of Hazardous Materials Enforcement.

To understand actual field inspection and enforcement activities, we interviewed officials and examined documents from the Federal Highway Administration's region 9 and officials and investigators at the Federal Highway Administration's field offices in Vermont and California. We also interviewed officials at the Coast Guard's Marine Safety Offices in California, and officials and inspectors at the Federal Aviation Administration's Western-Pacific Regional Office. Additionally, we interviewed officials from the State of California's Highway Patrol, Office of Emergency Services, and Environmental Management Agency.

We also visited DOT's Transportation Systems Center in Cambridge, Massachusetts, where we interviewed the director, the chief of the HAZMAT Special Projects Office, and the facility manager of the Data Services Division. We obtained documentation on the management of the RSPA Hazardous Materials Information System and the RSPA HAZMAT/Pipeline Data Improvement Study initiated in 1987.

Our audit work was conducted between June 1990 and June 1991. We performed this review in accordance with generally accepted government auditing standards. We discussed the results of our work with DOT officials and have reflected their views in this report as appropriate. In addition, we obtained comments from DOT officials on a draft of this report and have incorporated these comments in the report, as appropriate.

Major DOT Systems Supporting Hazardous Materials Transportation

System	Agency	Date started	Systems description	HAZMAT missions supported	Modes covered
Hazardous Materials Information System	RSPA	1971	The principal management and research system used to monitor the safety of hazardous materials transportation for the Department. It is used for compiling, analyzing, and disseminating DOT-wide HAZMAT incident data. It also stores information on RSPA's HAZMAT enforcement actions, Departmental HAZMAT exemptions and approvals, regulation interpretations, and radioactive shipping routes.	Regulation, RSPA HAZMAT inspections and enforcement actions, HAZMAT incident reporting	All
Incident Reporting Information System	Coast Guard	1990	A data base supported by the National Response Center, the national point of contact for receiving, storing, and transmitting telephone reports on all oil, chemical, radiological, biological and etiological discharges into the environment anywhere in the United States.	Emergency response, HAZMAT incident reporting	All
Marine Safety Information System	Coast Guard	1981	Used to provide information support for the operation, management, and decision functions of the Coast Guard's marine safety functions (e.g., vessel documentations, inspections, port safety actions, casualty and incident investigations, and violations processing).	Inspection/enforcement	Marine
Motor Carrier Management Information System	Federal Highway	1988	The central source of information used by the Office of Motor Carriers to support its safety program. It contains information on interstate motor carrier safety performance records (e.g., on-site reviews of carriers and HAZMAT shippers, data collected on the driver and vehicle during roadside inspection and accident/incident reports) as well as census information on the carriers.	Inspection/enforcement	Highway
Motor Carrier Safety Information Network	Federal Highway	1986	An information management system designed to support the Motor Carrier Safety Assistance Program. Participating states enter roadside inspection data (e.g., carrier information, driver and vehicle information, and safety violations) and accident data.	Inspection/enforcement	Highway
Civil Aviation Security Information System	Federal Aviation	1986	A data base management system designed to collect data at the field, regional, and national levels. The hazardous materials subsystem implemented in 1988 is used to monitor airports, air carriers, and inspection activities.	Inspection/enforcement	Air
Railroad Safety Information System	Federal Railroad	1975	The primary source of information used to identify, record, and report information relative to rail safety. It contains information on inspections (e.g., track, locomotives and cars, signals, and operations), accidents/incidents, and the history of all public and private crossings in the United States.	Inspection	Rail
Violation Tracking System	Federal Railroad	1982	A data base management system used by the Office of Chief Counsel at the Federal Railroad Administration to track violations and cases related to railroad safety, from violation report to settlement.	Enforcement	Rail

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